

Part I

Chemical-Specific Objectives Task Force Report

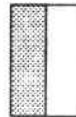
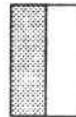
CHEMICAL SPECIFIC OBJECTIVES TASK FORCE

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CHEMICAL SPECIFIC OBJECTIVES TASK FORCE

ATTENDANCE ROSTER

| Name | Interest Category | M/A | April 20 | April 21 | May 18 | June 26 | July 18 | Aug 22 | Sept 19 |
|-------------------|----------------------|-----|----------|----------|--------|---------|---------|--------|---------|
| William M. Ellgas | POTW | M | | | | | | | |
| Ing-Yih S. Cheng | POTW | A | | | | | | | |
| Roger B. James | Stormwater | M | | | | | | | |
| David Jones | Stormwater | A | | | | | | | |
| Ray Arnold | Industry | M | | | | | | | |
| David L. Lutrick | Industry | A | | | | | | | |
| Robert S. Hedrick | Agriculture | M | | | | | | | |
| J. Al Driver | Agriculture | A | | | | | | | |
| Maria Tikkanen | Water Supply | M | | | | | | | |
| Judy Heath | Water Supply | A | | | | | | | |
| Roger Gorke | Environmental | M | | | | | | | |
| Mario Menesini | Environmental | A | | | | | | | |
| Alexis Milea | Public Health | M | | | | | | | |
| David Morry | Public Health | A | | | | | | | |
| Diane Frankel | U.S. EPA | M | | | | | | | |
| Philip C. Woods | U.S. EPA | A | | | | | | | |
| Pete Phillips | Fish & Wildlife | M | | | | | | | |
| Jana Hofius | Fish & Wildlife | A | | | | | | | |
| Kim Taylor | Regional Boards | M | | | | | | | |
| Mike Carlin | Regional Boards | M | | | | | | | |
| Wendy Wyels | Regional Boards | A | | | | | | | |
| Ling L. Tseng | State Board | M | | | | | | | |
| Bill Ray | State Board | A | | | | | | | |
| Cheryl L. Langley | Pesticide Regulation | M | | | | | | | |
| David C. Carlson | State Board | A* | | | | | | | |

 = Present
 = Absent

M = Member
 A = Alternate
 A* = Alternate for month of April

CHEMICAL SPECIFIC OBJECTIVES TASK FORCE

TO: Members - State Water Resources Control Board

FROM: Chemical Specific Task Force

DATE: September 19, 1995

We respectfully submit this report consisting of 17 pages including this cover memo for your consideration.

Consensus was achieved on eleven of the twelve recommendations. Unless noted, the rationale also expresses the consensus of the task force.

On the issue of Total vs Dissolved Metals for Ambient Water Quality Criteria, we were unable to reach complete agreement. The recommendations and rationale for and against "Total" and "Dissolved" are presented.

We thank you for this opportunity to assist you in developing a viable plan for the Inland Surface Waters and Enclosed Bays and Estuaries of California.

1. Site Specific Water Quality Objectives

- A. The development of site specific WQOs for inorganic and organic chemicals should be allowed where appropriate.
- B. The State should develop detailed guidance for the development of site specific objectives similar to the outline being developed by the Site Specific Objectives Task Force.

Rationale

- A. In accordance with federal law and regulations, WQOs must be based on sound scientific rationale and protect the designated uses of the receiving water. Under the following conditions, RWQCBs may consider the development of site-specific objectives (SSO) when:

- a statewide objective is not being achieved in the receiving water;
- an NPDES permittee does not meet an anticipated numeric effluent limit based on the statewide objective and cannot be assured of achieving the effluent limit through reasonably achievable pollution prevention measures; and
- a written request for a site-specific study is filed with the Regional Board and funding sources are identified;
- or, the Statewide objective does not adequately protect the beneficial uses of a specific water body.

The need to establish site specific objectives arises because the WQOs established in state plans may not be appropriate for all water bodies in the State. Under certain circumstances, other approaches to achieve the statewide objectives may be more appropriate than development of an SSO. These approaches may include, but are not limited to use-attainability analyses and development of total maximum daily loads/wasteload allocations.

- B. Consistency in the development of SSOs is key to their application in the statewide plans. Guidance should be provided by the SWRCB regarding the policies and procedures for developing SSOs based on scientifically defensible methods.

2. Attainability Assessment

- A. In determining attainability, the State should review a statistically based sample set that includes recent data (including stormwater) from as many dischargers as possible, and compare these data against proposed WQOs.
- B. In its evaluation where appropriate and practical the State should use risk levels of 10^{-5} and 10^{-6} as part of their attainability analysis for potential carcinogens.
- C. The attainability evaluation should be done on a tiered basis that prioritizes chemicals according to their relative threat to the environment (ie. relative toxicity and presence in ambient receiving waters).
- D. During the Triannual review, the State should make provisions for ongoing review of attainability of WQOs when new information such as detection limits or toxicity factors become available, and should consider progress in attainment as part of its review process.
- E. For WQOs established below the current detection level where attainability cannot be determined, the State should make the attainability analysis a high priority in the next triennial review.

Rationale

- A. In developing water quality objectives it almost goes without question that the most current data from as many sources as possible is the best approach. In addition to attainability, an understanding of current technology and the range of analytical detection limits among dischargers is needed to assure that WQOs are both protective and achievable.
- B. In order to adequately assess economic impact a range of risk factors should be considered by the State Board. Though this is a policy issue, to meet their legal obligations to review economic impacts, the level of acceptable risk must be weighed in light of the cost of those technologies required to meet the WQOs and the benefits to society by using a particular risk level (recognizing that everything has a certain risk).
- C. Because of limited resources and the absence or limited availability of data regarding certain toxicants, a tiered approach addressing constituents of greatest concern first will have the greatest environmental benefit and

economic value to the citizens of the State.

- D. During the Triannual review, as new, scientifically-validated information becomes available, it is incumbent upon the State to reevaluate attainability. With that in mind, the Task Force has suggested the following chemicals as most problematic for attainment: aldrin/dieldrin, chlordane, DDT & metabolites, endrin, benzidine, mercury, PCBs, PAHs, dioxin, lindane, heptachlor/heptachlor epoxide and selenium. Although mercury and selenium are not carcinogens, a preliminary attainment analysis should be done for concentrations of:

| | | | | |
|----------|-------|-------|--------|------|
| Mercury | 0.012 | 0.025 | 0.0018 | ug/L |
| Selenium | 2.0 | 0.2 | 0.05 | ug/L |

- E. As technological advances provide the capability of analyzing compounds at increasingly lower levels of detection, it is incumbent on the State to use this information to assess attainability for WQOs established at levels below detection limits at the time of their development.
- F. SWRCB Staff Comments - The recommendation specifically requests that "recent effluent (including stormwater) data" be reviewed. The CSO task force has engaged in repeated discussions concerning the amount and quality of monitoring data. The entire task force has agreed that the availability of monitoring data will dictate the extent of the attainment analysis. However, in many cases, monitoring data are scarce. For example, the stormwater representative has indicated that only limited monitoring data are available for stormwater discharges. Since the members and alternates of this task force are aware of the limited data available for receiving water as well as effluent monitoring data for all types of discharges, State Board staff will conduct as complete an attainment analysis as the available monitoring data will allow.

Since an attainment analysis will be done for all chemicals targeted for the ISWP/EBEP including those listed in this recommendation, the attainment analysis will not be done on a tier basis. CSO task force is aware that the ISWP/EBEP go through a review process every three years when these statewide plans are updated. SWRCB staff does not intend to conduct an additional attainment analyses outside the triennial review process. It is not clear how the "progress in attainment" would be factored in an attainability analysis.

It is premature to conduct a preliminary attainment analysis for mercury

(Hg) and selenium (Se) with the concentrations listed in this recommendation because these concentrations may not be based on the most current data.

3. Synergistic/Additive Effects

We believe narrative and/or numeric toxicity objectives for ambient waters adequately account for the potential of synergistic/additive effects that cannot be incorporated into the chemical specific objective calculation at this time.

Rationale

There is insufficient information to account for synergistic/additive effects in establishing chemical specific WQOs. It is believed by the Task Force that the use of whole effluent toxicity testing for ambient waters is the best available approach toward addressing this issue at this time, and can adequately account for these effects. Therefore, narrative and/or numeric toxicity objectives for ambient waters adequately protects for this potential since this effect cannot currently be incorporated into the chemical specific objective calculation.

4. Development of Water Quality Objectives

The State should reexamine/recalculate the USEPA National Criteria Guidance (Gold Book) in developing WQOs. This process should include:

For Human Health Criteria:

- Recalculation with new IRIS numbers

- Recalculation with OEHHA and other cancer potency factors

For Aquatic Life Criteria:

- Screen out suspect data, add new data, and recalculate criteria

Prioritize on the basis of attainment and attainability

Rationale

Some members of the Task Force recognize that existing databases often times has information which is outdated. As current technologies permit

better information, it should be substituted for data of a lesser quality. It is the responsibility of the State Board to set WQOs in the context of the best available science. As noted in the discussion under attainability assessment, so as to maximize environmental and economic benefits, recalculation or reexamination of EPA Gold Book criteria should be prioritized based on attainability.

Some members of the Task Force understand that the State is in the process of convening a science advisory committee for the purpose of providing technical evaluation of the many complex issues facing the Board. A worthwhile task which could be assigned to this committee could be the review of the scientific rationale behind the development and use of key calculation factors such as the:

- 10^{-5} , or 10^{-6} risk factor
- 6.5 g/day, 23 g/day, or some other fish consumption rate value
- 70 kg for the average human body weight value, etc.
- bioaccumulation factors
- cancer potency factor (q^*)

as they apply to the development of California WQOs.

Fundamental to the development of WQOs is the scientific research used in assessing environmental impacts or toxicity to test species. A committee of technical experts could be used to develop standard criteria such as study design, QA/QC, etc. for objectively evaluating studies for their appropriate use in developing WQOs

State Board staff rationale - The current recommendation is requesting State Board staff to review the entire USEPA Gold Book and to "screen out suspect data". It is unclear to State Board staff what is meant by "suspect data". The State Board does not have the resources to reexamine or recalculate all USEPA Gold Book criteria. Since the USEPA Gold Book was published in 1986, there has been numerous updates of the criteria contained in the Gold Book. For example, the National Toxics Rule (NTR) noticed in the December, 1992 Federal Register, the Great Lakes Initiative (March 23, 1995 Federal Register notice) and the NTR amendments (May 4, 1995 Federal Register notice) contain updates of USEPA Gold Book criteria. State Board staff also intends to use data sources such as IRIS which contains monthly updated information for human health and aquatic life criteria when developing new water quality objectives. Because SWRCB staff will use the most

current data for developing objectives for all chemicals to be included in the ISWP/EBEP, staff will not prioritize on the basis of attainment.

5. Site Specific vs. Default Values

SWRCB or RWQCBs, as appropriate, should consider use of regional and/or site specific data in lieu of default values when there is an issue to be addressed, and when data are available or can be developed.

Rationale

The use of field data reflecting the nuances of an ecosystem is preferable to using default values when assessing environmental impacts. When the efforts have been made to collect data from a defined location or water body to more accurately evaluate a specific condition or assumption, these data should be used in deference to default values in the calculation of site specific WQOs. For example, a state-wide fresh water fish consumption rate of 6.5 g/day may be appropriate for calculating the state objective, however, in some regions, or waterbody types, fresh water fish consumption could be demonstrated to be higher or lower. In those cases where it can be shown that the default assumptions are either over or under protective, the site specific data should be used.

6. Dissolved Oxygen Objectives

The SWRCB should direct the RWQCBs to address consistency in the implementation of dissolved oxygen objectives when developing Basin Plans. Appropriate numerical objectives differ depending on the water body and its beneficial uses. The Task Force recommends that numerical objectives for dissolved oxygen (absolute and/or relative* values) be identified at the Regional level. In order to promote statewide consistency, the SWRCB should consider developing a set of numeric absolute and/or relative objectives for generic water body types that can then be implemented by the Regions.

*absolute = mg/L; relative = 10% change for example.

Rationale is self evident

7. Chemical Speciation

Speciation is an important factor to consider both in terms of effects and the transformation between different chemical species in an aquatic system. At this time, there is insufficient knowledge for most chemicals to fully account for speciation in WQOs. However, as more information becomes available, the Task Force encourages the State Board to refine the objectives to better account for speciation.

Rationale is self evident

8 Total vs Dissolved Metals for Ambient Water Quality Criteria

8 A supported by: Environmental, Public Health, USEPA, Fish & Wildlife, WSRCB

Water quality objectives shall be based upon total recoverable concentrations of inorganic toxicants. Except for mercury and selenium, and other bioaccumulative inorganic toxicants, RWQCBs may adopt site specific objectives based upon the dissolved fraction of inorganic toxicants when total recoverable objectives cannot be attained.

Rationale

Pros:

1. In the absence of sediment or tissue criteria, the use of total recoverable metals in water quality criteria development would help to account for sediment or food chain effects.
2. Total recoverable objectives provide protection for sediment dwelling organisms, organisms impacted by food chain effects and estuaries where particulate metals are likely to accumulate.
3. Total recoverable analyses are less expensive than dissolved analyses at a comparable level of accuracy.
4. Use of total recoverable makes the considerable expense of developing site-specific translators unnecessary.

5. If total recoverable criteria are being attained, then water quality objectives should be based on total recoverable concentrations.
6. There are tested and formally recognized test methods for the determination of total recoverable metals.

Cons submitted by: POTW, Storm Water, Industry, Agriculture, Water Supply

1. No scientific support for the use of total recoverable objectives to address sediments, food chain or other fate-related issues has been provided to, or examined by, the Task Force. We are not aware whether any support exists for this position.

EPA has devoted significant time and resources to the development of rational sediment criteria and other criteria. EPA has not suggested the use of total recoverable water column criteria as surrogates for sediment, tissue or other criteria and we are not aware of any proposals.

2. The incremental cost of dissolved versus total recoverable analyses is not significant. The cost difference, depending on the filtration step. The cost of reliable, low detection limit metals analyses ranges from \$40 to \$ 60 per sample, exclusive of charges for filtration.
3. Test protocols for dissolved metal are well recognized and commonly performed by all commercial laboratories. Numerous scientific studies have been performed over the past 20 years which have involved the measurement of dissolved metals. —
4. The cost for development of translators is not exorbitant. The cost of site-specific translators will be borne by dischargers, at their option.

8B. supported by: POTW, Storm Water, Industry, Agriculture, Water Supply, USEPA, RWQCB

8B.i Setting Objectives. Aquatic life objectives for metals and metalloids shall be based on the dissolved form. Wildlife based objectives for

bioaccumulative substances such as Hg and Se, and human health-based objectives shall be based on the total recoverable form.

Rationale

Pros:

Objectives are intended to represent the amount of a toxicant at or below which there will be no unacceptable impacts on beneficial uses. There are different mechanisms by which aquatic organisms and wildlife are affected by toxicants. In some cases, the primary concern is the amount of a toxicant dissolved in water. In other cases, the primary concern is exposure through the food chain.

Total recoverable metals are determined by the analysis of an unfiltered sample which employs a strong acid digestion. These measurements typically include a significant fraction of the metals associated with particulates in the sample. On the other hand, dissolved metals are determined by analysis of a filtered sample using a similar acid digestion. Dissolved metals typically exclude particulate-associated metals.

Available information supports the use of dissolved objectives when there is concern over toxic levels in the water column because exceedance of these objectives properly indicates impairment of beneficial uses and a need for comprehensive management to improve water quality at those sites. EPA's position is that, "... the use of dissolved metals to set and measure compliance with water quality standards is recommended because dissolved metals more closely approximates the bioavailable fraction in the water column than does total recoverable metals. . . EPA recommends that State water quality standards be based on dissolved metal. EPA will also approve a State risk management decision to adopt standards based on total recoverable, if those standards are otherwise approvable as a matter of law." (60FR 86, p 22229, et seq.).

With bioconcentration and/or bioaccumulative metals, this relationship does not hold.

Among the concerns about using total recoverable objectives there is the consideration that under ambient conditions in receiving water bodies, total recoverable values are often highly variable, and

are correlated with suspended solids concentrations which may vary significantly over short time intervals (minutes or hours) depending on a variety of physical factors (depth, flow velocity, sediment grain size, wind conditions, and other factors influencing sediment transport). Dissolved concentrations are much less variable, therefore, grab samples yield data which better represents conditions existing over longer time intervals (days).

Cons to all of 8B are after item 8B.iii

8B.ii Implementation of Metals Objectives. Permits and waste discharge requirements should be written in terms of the total recoverable metals and metalloids. Regional Boards may elect to write and dischargers may propose permit limits in terms of dissolved concentrations when it has been demonstrated that receiving water and sediment quality will not be affected to the point where dissolved objectives are likely to be exceeded and sensitive beneficial uses are protected.

Rationale

Pros:

Current EPA permit regulations require effluent limits to be written in total recoverable. If and when EPA changes the permit regulations to allow the use of dissolved form, the RWQCBs may issue permits with effluent limitations expressed in the dissolved form (40CFR, Part 122, et seq.).

Objectives describe the allowable concentration of a particular toxicant in the water column. That concentration is directly related to toxicants desorbing from and absorbing to particulates entering or already present in the water and bottom sediments. Water quality that results after discharge of waste is dependent on the amount of toxicants already present in each of these three compartments, and the total amount of that toxicant added through discharge activities. At the present time, the dynamics of partitioning between these compartments is not well understood and it is impossible to develop accurate predictions of dissolved concentrations. Regulating waste discharge as total recoverable provides an appropriate degree of protection in light of this uncertainty. It is appropriate to modify discharge limits as better site-specific partitioning information becomes available.

Cons to all of 8B are after item 8B.iii

8B.iii Implementation of Dissolved Objectives Through Permit Limitations is an issue that needs further discussion by interested and affected parties. The Task Force recommends that the State continue meeting with stakeholders to develop alternative mechanisms.

Pro rationale to 8B.iii is self evident.

Cons to 8B.i, 8B.ii, 8B.iii: supported by: SWRCB, Public Health, Environmental, Fish & Wildlife

1. Although USEPA has indicated that dissolved objectives are protective of aquatic life in the water column, other aquatic life compartments are not protected. Water quality objectives based upon dissolved metal concentrations do not account for potential impacts on aquatic organisms and ecosystems due to accumulation of metals in sediments, or due to food chain effects involving benthic organisms. Such objectives also do not protect aquatic life from toxicity due to metals associated with particulates.
2. Additional controls are needed to protect other compartments, e.g. benthic organisms.
3. It is inappropriate to recommend dissolved criteria until EPA defines procedures to develop site-specific translators for determining effluent limits in terms of total recoverable as required by NPDES permit regulations. When total recoverable metals criteria are converted to dissolved metals criteria as shown in the National Toxics Rule amendments published in the May 4, 1995 Federal Register, USEPA uses conversion factors that are equal to or less than 1. When these conversion factors are used, the resulting numerical value for the new dissolved criteria is equal to or less than the original total recoverable value in most cases. Pursuant to current USEPA guidance, in the absence of a site-specific translator, a default translator of "1" is to be used. Therefore, an effluent limit based on a dissolved metal criterion would be equal to or more stringent than an effluent limit based on a total recoverable metal criterion.

4. There are no methods that measure the dissolved fraction of metals. The current practice of filtering a sample prior to analysis is a size exclusion procedure. i.e., dissolved = matter smaller than 0.45μ . There are no procedures that will eliminate the presence of undissolved, but filterable metals.
5. Development of site-specific translators constitutes an additional expense.

9. Constituents of Concern

The Task Force recommends that the State Board develop water quality objectives for all toxic pollutants which adversely affect beneficial uses adopted within the State of California for inland surface waters and enclosed bays and estuaries, in compliance with the Clean Water Act, Section 303. Toxic pollutants include, but are not limited to, the priority toxic pollutants listed in the Clean Water Act, Section 304.

Rationale

Water quality objectives should be developed as soon as possible for the following pesticides: diazinon, carbofuran, malathion, and chlorpyrifos because monitoring studies have demonstrated that these pesticides have a high potential for adversely affecting beneficial uses in several important watersheds in California. Documentation of these studies include the SWRCB's Report of the Technical Advisory Committee for Pesticide Management, November 1994. These pesticides were detected through toxicity tests, identified through toxicity identification evaluations and confirmed through chemical analyses. In many cases, these pesticides were detected at levels which exceeded 96-hour acute toxicity LC50 values.

Agriculture Stakeholders Qualification -

Support for this recommendation is based on the understanding that it is a restatement of existing law. The support does not extend to any attempt by some members of the Task Force to identify or prioritize candidates for adoption of WQOs.

Identification of specific chemicals and prioritization is a process

which may have significant impacts on the interests of specific groups or individuals. Impacts of this type should not be proposed without adequate notice and opportunity for meaningful participation by all interested parties.

The Task Force is a poor vehicle for such a process in comparison to the alternative avenues available to the SWRCB, RWQCBs and their respective staffs. In fulfilling the obligations under this recommendation the SWRCB and RWQCBs should provide specific notice and opportunity for meaningful participation to ensure fundamental fairness and scientifically sound decision making.

10. Human Health Criteria Equation

SWRCB should consider using distributions as calculated by models, such as the Monte Carlo techniques, for default and other elements of EPA's human health criteria equation as a means of describing objectives and considering economics in the process of selecting an objective.

Rationale

When developing human health water quality objectives, SWRCB should use EPA's equations for calculating human health criteria. SWRCB should consider working with OEHHA in using the Monte Carlo approach based on the available distributions. Distributions for body weights and drinking water consumption are available and should be used as inputs to the Monte Carlo program. Additionally, the SWRCB should examine the effect of the use of the most probable slope of the cancer potency factor. If there are appropriate distributions for California fish/shellfish consumption, they will be used as input to the Monte Carlo program for freshwater fish/shellfish consumption and marine fish/shellfish consumption separately. Otherwise, the input into the Monte Carlo program for fish/shellfish consumption should be either the best available individual point estimates, one for freshwater fish/shellfish consumption and the other for marine fish/shellfish consumption, or an alternative distribution based on best professional judgement.

This recommendation details the most appropriate way to calculate human health objectives. While the distributions for body weights are easily defined because of the ease of measurement resulting in an ideal bell shaped curve, the distributions for drinking water consumption will be a bit difficult to define because of the limited amount of available data and

the controversy over the methods of measurement. Since there may or may not be distributions for California fish/shellfish consumption, the use of the best available point estimates is the alternative to distributions as input into the Monte Carlo program. The best available point estimates will include a point estimate for freshwater and a point estimate for marine water. The Monte Carlo program has the capability of using distributions and/or estimates in the same program. When distributions are not available, point estimates are an alternative.

11. Detection Limits for Reporting Date

SWRCB should develop guidance for standardized reporting of detection levels and the methodology used to define such levels (ie. detection limits). The Task Force also recommends that the SWRCB continue to meet with stakeholders to develop this guidance.

Rationale

SWRCB/RWQCB Stakeholders -

There is a need for standardization of reportable detection limits. Without standardization, monitoring data reported as "Non Detect (ND)" has no meaning. There are, however, at least two issues that must be addressed prior to the development of these state-wide detection limit values.

First, the computational method must be selected. USEPA has published in the Federal Register (40CFR, Part 136, Appendix B) a method for the computation of detection limits from laboratory data. This method has been criticized as incomplete in its protection from false positive errors. State Board staff would have to investigate other computational methods in order to select one that provides sufficient data quality protection.

Second, computational methods rely on assessment of large data sets. State Board staff will have to examine sufficient quantities of data relevant to state-wide laboratory effort, or will have to resort to state-wide collection of sufficient numbers of individual laboratory values. In either case, State Board staff may need additional resources to acquire and manipulate the data before computing state-wide detection limits.

In light of recent comments and reviews, State Board staff will

assure that there will be consistency across all State Board Plans. The same definitions and computational models are being developed and will be applied to all State Board Plans.

12. Numeric Criteria for Aquatic Life

In developing numeric criteria for Aquatic Life, the following recommendations should be considered by the SWRCB:

1. Where data are sufficient to fulfill protocol requirements use the EPA Tier I approach.
2. Where data are not sufficient to satisfy EPA Tier I protocol requirements, develop a program to obtain sufficient data.

Rationale

One method of fulfilling this recommendation is as follows:

1. Freshwater criteria shall be calculated using toxicity tests conducted on resident North American freshwater species. Saltwater criteria shall be calculated using toxicity tests conducted on resident North American saltwater species.
2. Toxicity studies shall be reviewed for acceptability following CA Department of Fish and Game's (DFG) written protocol (which is based on EPA and ASTM guidelines).
3. Where sufficient acceptable acute and chronic data are available to meet EPA's data requirements, then the EPA Tier I protocol shall be used to calculate criteria. EPA defines "sufficient data" as at least one acceptable acute test for eight different categories of species, and three acute-chronic ratios for at least three different families.
 - a. The EPA Tier I protocol may still be used if acute data is available for only seven of the eight categories of species, providing that the missing category is not for an acutely sensitive species.
 - b. The EPA Tier I protocol may still be used if only two acute-chronic ratios exist. In this case, an assumed acute-chronic ratio of

18 (as used in the EPA Tier II* method) will be used in place of the missing acute-chronic ratio (for freshwater).

4. The EPA Tier I protocol may not be used to calculate criteria if acute data exists for less than seven of the required categories, and/or if there are less than two acute-chronic ratios. In this case, the EPA Tier II protocol will be used to calculate an interim criterion. This criterion will remain in place until/if additional studies are undertaken to complete the database required for the EPA Tier I criteria calculations. When new data becomes available, and is found to be acceptable using DFG's guidelines, then the Board may elect to calculate a new criterion using the Tier I approach.
5. Although State Board's Ocean Plan method is an optional method, EPA Tier I and Tier II methods provide more rigorous criteria.

Other methods may be appropriate and may be presented during the public comment period.

Citations for recommendation #12:

Stephen et al, 1985. Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses, USEPA, PB85-227049.

EPA Tier II method. Final water quality guidance for the Great Lakes System. Federal Register. Vol 60, No. 56, p.15366 (23 March 1995). * This guidance applies to the Great Lakes System and has not been adopted nationally.

Ocean Plan method. (a) Klapow and Lewis, 1979. Analysis of toxicity data for California marine water quality standards. J Wat Pol Cont Fed 51(8):2054-2070. (b) Carlson et al, 1980. Sacramento River toxic chemical risk assessment project, final report. SWRCB Report No. 90-11WQ.